

REMARKS

The Examiner has rejected claims 1-4 as purportedly indefinite, arguing that “[t]he phrase ‘diamond-like’ renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by ‘like’), thereby rendering the scope of the claims unascertainable.” Office Action at page 2. Applicant respectfully disagrees.

Applicant submits that the term “diamond-like-carbon coating” is, in fact, a term of art with a well-defined meaning. Applicant notes that the Manual of Patent Classification Procedure defines Patent Subclass 249.7, entitled “Diamond-like carbon coating (i.e., DLC),” as a “[p]rocess wherein the resulting coating consists primarily of metastable amorphous carbon and contains both hybridized tetragonal  $sp^3$  and trigonal  $sp^2$  bonds. (1) Note. The diamond-like carbon may contain, in addition to the primary amorphous phase, crystals ranging in diameter from 2 nm to 20 nm.” In light of this rather precise definition promulgated by the U.S. Patent and Trademark Office, Applicant respectfully submits that the term “diamond-like-carbon coating” is not indefinite.

The Examiner has further rejected claims 1-4 as purportedly obvious, arguing that “AAPA teaches a jig to be in contact with solder in reflow soldering (specification, paragraph 8) wherein said jig is provided with a coating to be in contact with the solder (specification, paragraph 8)[,] Chen teaches a hot bar apparatus having, generally, a diamond or diamond-like surface (abstract) [and] Singer teaches advantages of an amorphous carbon film over diamond (page 1 of 3)” such that “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of AAPA to utilize a diamond-like coating in order to increase wear resistance

(Chen col. 1, ll. 55-68) and further to modify the invention of AAPA and Chen to utilize Sandia's amorphous carbon film in order to provide even greater wear resistance (Sandia page 1 of 3)." Office Action at page 3.

Applicant respectfully disagrees with the Examiner's characterization of the Singer reference. Rather than teaching "advantages of an amorphous carbon film over diamond," Singer explains that "[a] team of Sandia scientists has developed a simple, inexpensive way *to relieve the normal internal stress of amorphous (noncrystalline) diamond films* - a significant advance in producing wear-resistant coatings," and that "[t]he new material enables the creation of amorphous stress-free, amorphous diamond coatings . . . harder than any known coating, except for crystalline diamond." Sandia pages 1 and 2.

Applicant respectfully submits that the references relied upon by the Examiner, alone or in combination, cannot anticipate or render obvious currently amended claim 1. As noted, in part, by the Examiner, Chen et al. teaches "[a] *hot bar apparatus* for effecting solder bonds for high density electronic components ha[ving] a diamond or diamond-like (i.e., a generally diamond crystal lattice with graphite impurities) surface that makes contact with the leads of the electronic component *and transmits the heat necessary to effect a solder bond.*" Chen et al. Abstract. Accordingly, Chen et al. neither discloses nor suggests "[a] *jig* to be in contact with *cold contact tails* during reflow soldering to effect a solder bond between the contact tails and pads of a board" as recited in claim 1. The claimed jig is a mechanical device and not a means for heating as taught by Chen et al.

Further, in order to be able to implement the hot bar configuration, in contrast to the claimed jig, Chen et al. explicitly teaches “[a] bar of refractory metal ha[ving] a layer of elemental carbon of a cubic crystalline form, such as diamond or diamond-like materials”, the “apparatus includ[ing] a thermode for converting an electrical current into heat to effect the temperature of the thermode” with “[t]he thermode ha[ving] a coating of diamond or diamond-like material covering a portion thereof *to provide a durable layer that heat is transferred through in order to solder bond each external lead to its respective conductor.*” Chen et al. col. 2, lines 21-43. Rather than disclosing a jig “provided with diamond-like carbon coating on at least a portion which is to be in contact with the solder *so that the non-adhesive nature of the diamond-like-carbon coating is exploited,*” as recited in claim 1, the diamond-like-coating in Chen et al. is used for its capacity to conduct heat generated by current flow in the thermode elements **12** and **18** to melt the bonding material **26** that is in contact with external leads **22** and conductors **24**. See FIG. 1 and col. 3, line 40 to col. 4, line 5. As such, Chen et al. does not disclose or even suggest the above-mentioned limitations of currently amended claim 1.

Further, the failure of Chen et al. to teach a “jig to be in contact with cold contact tails and solder during reflow soldering to effect a solder bond between the contact tails and pads of a board,” said jig being “provided with diamond-like-carbon coating on at least a portion which is to be in contact with the solder,” thereby exploiting the non-adhesive nature of diamond-like-carbon coatings to prevent adhesion between jig and solder, is not remedied by the teachings of the Sandia article, which, with its focus on internal stress in the coating, addresses the wear-resistance of diamond-like-coatings, noting “significant *advance in producing wear-resistant coatings*” and that “[t]he new

material enables the creation of amorphous stress-free, *amorphous diamond coatings . . . harder than any known coating, except for crystalline diamond.*” Sandia pages 1 and 2.

As such, Chen et al. and the Sandia article do not disclose or even suggest the above-mentioned limitations of currently amended claim 1.

In any event, even if the three references relied upon by the Examiner were to disclose all of the limitations of claim 1, which they do not, there is still no motivation to combine the references in the manner suggested by the Examiner. The AAPA deals with the problems caused by unwanted adhesion between a jig and solder, Chen et al. discusses the use of high thermal conductivity diamond-like-coatings to transmit heat between a heat source (a thermode element) and solder, and the Sandia article addresses the improved wear resistance afforded by nominally stress-free diamond-like-coatings.

Because the references relied upon by the Examiner, alone or in combination, do not disclose or suggest every limitation of currently amended claim 1, for the reasons set forth above, Applicant further respectfully submits that, since claims 2 and 3 both depend from claim 1, and so contain all of its limitation, these dependent claims cannot be anticipated or rendered obvious by the prior art relied upon by the Examiner to reject claim 1.

Applicant notes that currently amended independent method claim 4 contains those limitations of claim 1 that distinguish claim 1 from the prior art relied upon by the Examiner. Accordingly, Applicant respectfully submits that, for the reasons set forth for claim 1, claim 4 cannot be rendered obvious by the prior art relied upon by the Examiner. Applicant further respectfully submits that, since new claims 5 and 6 both depend from

claim 4, and so contain all of its limitation, these dependent claims cannot be anticipated or rendered obvious by the prior art relied upon by the Examiner to reject claim 4.

**CONCLUSION**

In view of the above amendments and remarks, Applicants respectfully solicit the allowance of the pending claims. In the event that the application is not deemed in condition for allowance, the Examiner is invited to contact the undersigned. Applicants are aware of no fees due with this submission. If any fees are required, the Commissioner is authorized to charge such fees to Deposit Account Number 02-4377.

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Respectfully submitted,



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